Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.   (Currently amended) An image processing apparatus, wherein:

a first processing circuit and a second processing circuit are connected in m bits, ~~the apparatus comprising:~~

~~replacement means for replacing lower n bits of an m-bit image signal with n-bit additional information, and outputting an m-bit conversion image signal;~~

~~error calculation means for calculating an error between the m-bit conversion image signal replaced by the replacement means and the m-bit image signal before the replacement;~~

~~an error buffer for storing the error calculated by the error calculation means;~~

~~weight coefficient storage means for prestoring a weight coefficient for calculating a weight error;~~

~~weight error calculation means for calculating a weight error by multiplying the error stored in the error buffer by the weight coefficient stored in the weight coefficient storage means;~~

~~error correction means for correcting the m-bit image signal before the replacement, using the weight error calculated by the weight error calculation means; and~~

~~extraction means for extracting the lower n bits of the m-bit conversion image signal replaced and output from the replacement means.~~

the first processing circuit comprising:

image area separation means for discriminating whether a target image is a character or a photograph on the basis of input image data of red, green, and blue;

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color conversion means for converting the input image data of red, green, and blue into color signals of cyan, magenta, and yellow, respectively;

space filter means for executing filtering process on the color signals of cyan, magenta, and yellow, which are converted by the color conversion means, on the basis of discrimination signals discriminated by the image area separation means; and

information addition means for outputting an m-bit signal of each color, which is filter-processed by the space filter means, and an n-bit discrimination signal, which is discriminated by the image area separation means, as m-bit information, to the second processing circuit, and

the second processing circuit comprising:

information extraction means for extracting both the m-bit signal of each color and the n-bit discrimination signal from m-bit information output by the information addition means;

black-coloring means for generating a black color signal from the color signals of cyan, magenta, and yellow, which are extracted from the information addition means, on the basis of the discrimination signal, which are extracted from the information extraction means, and for outputting the color signals of cyan, magenta, yellow, and black;

γ correction means for correcting tone characteristics of the color signals of cyan, magenta, yellow, and black, which are output from the black-coloring means, on the basis of the discrimination signal extracted from the information extraction means; and

tone processing means for tone-processing the color signals of cyan, magenta, yellow, and black, which are corrected by the γ correction means, on the basis of the discrimination signal extracted from the information extraction means.

Claims 2 - 12.   (Canceled).

13.   (New)   The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

error correction means for correcting image information of target pixels in input signals of each color;

lower bit conversion means for converting lower bit of m-bit corrected image signal, which is corrected by the error correction means, into input n-bit discrimination signal, to be output as each m-bit information to the information extraction means;

error calculation means for calculating an error between each m-bit information from the lower bit conversion means and each corrected image signal corrected by the error correction means;

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing a weight coefficient for calculating a weight error; and

weight error calculation means for calculating a weight error by multiplying each error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, and for outputting the calculated weight error to the error correction means; and

the information extraction means outputs the m-bit information input from the lower bit conversion means to m-bit color signal, extracts the lower-bit from the m-bit information input by the lower bit extraction means, and outputs the lower-bit from the m-bit information as an n-bit discrimination signal.

14.   (New)   The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

error correction means for correcting image information of target pixels in the input signals of each color;

multi-value means for subtracting n-bit from each m-bit corrected image signal, which is corrected by the error correction means;

information bit addition means for adding the input n-bit discrimination signal to each m-n bit corrected image signal, from which a bit value is subtracted by the multi-value means, and for outputting a combination of the n-bits and the m-n bits as each m-bit information to the information extraction means;

error calculation means for calculating an error between each m-n bit corrected image signal, which is from the multi-value means, and each corrected image signal, which is corrected by the error correction means;

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing a weight coefficient for calculating a weight error; and

weight error calculation means for calculating a weight error by multiplying each of the error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, and for outputting the calculated weight error to the error correction means; and

the information extraction means comprises:

image bit extraction means for extracting m-n bit signals of each color of m-n bit from each m-bit information, which is input from the information bit addition means; and

information bit extraction means for extracting each of the discrimination signals of n-bit from each m-bit information, which is input from the information bit addition means.

15.   (New) The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

first conversion information pixel-determining means for determining a pixel position where information is added; and

information bit conversion means for converting each m-bit information, from the input color signals of each color and each input discrimination signal, according to the pixel position where the information is added by the first conversion information pixel-determining means;

the information extraction means outputs each m-bit information, which is input from the information conversion means, as each m-bit color signal; and

the information extraction means comprises:

second conversion information pixel-determining means for determining a pixel position where further information is added; and

information bit extraction means for extracting an n-bit discrimination signal from m-bit input information according to the pixel position where the further information is added by the second conversion information pixel-determining means.

16.   (New)   The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

error correction means for correcting the image information of the target pixels in the input signals of each color;

information bit conversion means for converting each m-bit corrected image signal, which is corrected by the error corrections means, into each discrimination signal, according to a determination of both the first conversion information pixels-determining means for determining the pixel position where further information is added, and the pixel position where further information is added by the first conversion information pixels-determining means, and for outputting each m-bit information to the information extraction means;

error calculation means for calculating the error between each m-bit information from the lower bit conversion means, and each corrected image signal, which is corrected by the error correction means;

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing a weight coefficient for calculating a weight error; and

weight error calculation means for calculating a weight error by multiplying each of the error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, and for outputting the calculated weight error to the error correction means;

the information extraction means outputs each input m-bit information from the information bit conversion means, as the m-bit color signals of each color; and

the information extraction means comprises:

second conversion information pixel-determining means for determining a pixel position where further information is added; and

information bit extraction means for extracting an n-bit discrimination signal from m-bit input information according to the pixel position where the further information is added by the second conversion information pixel-determining means.

17.   (New) The image processing apparatus according claim 1, wherein:

the information addition means comprises:

error correction means for correcting the image information of the target pixels in the input signals of each color;

multi-value means for subtracting a bit-value from each m-bit corrected image signals, which is corrected by the error correction means to ℓ-n bits, ℓ being an integer value less than m;

information bit addition means for adding each input n-bit discrimination signal to each ℓ-n bit corrected image signal and for outputting combination of the n-bits and the ℓ-n bits, as each m-bit information, to the information extraction means;

error calculation means for calculating the error between each of the corrected image signals of ℓ-n bits from the multi-value means and each of the corrected image signals, which is corrected by the error correction means;

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing the weight coefficient for calculating the weight error; and

weight error calculation means for calculating the weight error by multiplying each error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, for outputting the calculated weight error to the error correction means; and

the information extracting means comprises:

image extraction means for extracting the ℓ-n bit color signals, from each ℓ-bit information, which is input from the information bit addition means; and

information bit extraction means for extracting each n-bit discrimination signal, from each ℓ-bit information, which is input from the information bit addition means.

18.   (New)   The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

error correction means for correcting the image information of the target pixels in an input signal of yellow color;

lower bit conversion means for converting the lower bit of the m-bit corrected image signal, which is corrected by the error correction means, into the input n-bit discrimination signal to be output as the m-bit information to the information extraction means;

error calculating means for calculating the error between the m-bit information, which is from the lower bit conversion means, and the corrected image signal, which is corrected by the error correction means;

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing the weight coefficient for calculating a weight error; and

weight error calculation means for calculating a weight error by multiplying each error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, and for outputting the calculated weight error to the error correction means; and

the information extraction means outputs the m-bit information, which is input from the lower bit conversion means, as the yellow color m-bit signal, and outputs n-bit discrimination signal after extracting lower bit from the m-bit information input by lower bit extraction means.

19.   (New)   The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

multi-value dithering means for dithering the image information of the target pixels in the input signals of each color, and for subtracting the dithered image information to m-n bit value; and

information bit addition means for adding each n-bit input discrimination signal to each m-n bit image signal, from which the bit value is subtracted by the multi-value dithering means, to be each m-bit information to the information extraction means; and

the information extraction means comprises:

image bit extraction means for extracting the color signals of each color information of the m-bit input from the information bit addition means; and

information bit extraction means for extracting each n-bit discrimination signal, from each m-bit information, which is input from the information bit addition means.

20.   (New)   The image processing apparatus according to claim 1, wherein

the information addition means comprises:

difference information calculation means for calculating difference information of each input discrimination signal;

error correction means for correcting the image information of the target pixels in the input signals of each color;

lower bit conversion means for converting the lower bit of each m-bit corrected image signal, which is corrected by the error correction means, each n-bit discrimination signal, and the 1-bit, which indicates whether or not there is a difference calculated by the difference information calculation means, to be output as each m-bit information to the information extraction means;

error calculating means for calculating an error between each m-bit information from the lower bit conversion information and each corrected image signal corrected by the error correction means;

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing the weight coefficient for calculating a weight error; and

weight error calculation means for calculating a weight error by multiplying each error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, for outputting the calculated weight error to the error correction means; and

the information extraction means outputs each m-bit information, which is input from the lower bit conversion means as each m-bit color signal, and for extracting lower bit from the information of the m-bit input by additional information extraction means, which is output as each n-bit discrimination signal.

21.   (New)   The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

first conversion bit determination means for discriminating n-bit in m-bit image signal;

error correction means for correcting image information of the target pixels in the input signals of each color;

information bit conversion means for converting each m-bit corrected image signal, which is corrected by the error correction means, the n-bits discriminated by the conversion bit means, into each n-bit discrimination signal, to be output as each m-bit information to the information extraction means;

error calculating means for calculating an error between the m-bit information from the information bit conversion means and each corrected image signal corrected by the error correction means;

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing the weight coefficient for calculating a weight error; and

weight error calculation means for calculating a weight error by multiplying each error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, and for outputting the calculated weight error to the error correction means;

the information extraction means outputs each m-bit information, which is input from the information bit conversion means, as the m-bit signals of each color; and

the information extraction means comprises:

second conversion bit determination means for discriminating n-bits in the m-bit image signals; and

information bit extraction means for extracting each discrimination signal of the n-bits, which is discriminated by the second conversion bit determination means, from each input m-bit information.

22.   (New)   The image processing apparatus according to claim 1, wherein:

the information addition means comprises:

error correction means for correcting the image information of the target pixels in the input signal of each color;

random conversion means for converting the n-bit discrimination signal into a randomly-lined n-bits;

lower bit conversion means for converting the lower n-bit image signals of each m-bit with the randomly-lined n-bits, which are converted by the random conversion means, and for outputting each m-bit information;

error calculation means for calculating the error between each m-bit information, which is from the lower bit conversion means, and each corrected image signal, which is corrected by the error correction means; wherein

an error buffer for storing each error signal calculated by the error calculation means;

weight coefficient storage means for storing the weight coefficient for calculating a weight error; and

weight error calculation means for calculating a weight error by multiplying each error signal stored in the error buffer by the weight coefficient stored in the weight coefficient storage means, and for outputting the calculated weight error to the error correction means;

the information extraction means outputs each m-bit information, which is input from the lower bit conversion means, as the m-bit signals of each color; and,

the information extraction means comprises:

lower bit extraction means for extracting each lower bit from the information of each input m-bits; and

random reverse conversion means for reverse-converting each lower n-bits, which is extracted by the lower bit extraction means.